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Notes and Comments

Power from Sludge Gas

IT is a curious phase of modern civilisation, which will no doubt receive the attention of historians yet unborn, that while one half of the population of the world is seeking by all means in its power to encourage the consumption of materials of every character, the other half is doing its best to frustrate those efforts. Even a household may be divided against itself; of two brothers, one may be a mining engineer whose livelihood depends upon the demand for coal, whilst the other may be a metallurgist whose principal object is to produce steel cheaply, one of the chief factors in which is the reduction of the fuel consumption in the furnaces.

Economists may argue against the use of such extraneous sources of power as sludge gas, but it is in practice comparable with the use of natural gas in America. The long view must be taken, and we hear too often the plea for increased consumption of coal. It may or may not be a laudible ambition of this generation to amass wealth, but we should prefer the emphasis to be placed, as it was a generation ago, on the need for conserving those raw materials which Nature has given to us. It is comforting to know that our supplies of coal will last for many hundreds of years to come; but it is more than likely that in five hundred years hence mankind will be more unified and national barriers will have disappeared. When mankind has organised itself for the greatest good of all, and when our artificial barriers have broken down so that production is organised solely to supply goods rather than to amass wealth for the producer, we can conceive that our descendants of those days will speak very hardly of us who have wasted the natural resources of Nature to obtain a temporary advantage.

A Valuable Fuel

The gases generated from sewage consist largely of methane and are a valuable fuel. Some of the earlier attempts to use the undoubted fuel value of sewage sludge were on the lines of briquetting the dried sludge mixed with coal or peat prior to gasification in a producer; the recovery of the nitrogen in the form of sulphate of ammonia was an important item in the economics of the process, and when sulphate manufacture ceased to become profitable the suggestion lost its attractiveness. So far as we can trace it (and here we are open to the correction of our readers) the earliest reference to the commercial utilisation of sewage gas was in a paper read before the British Association, by J. D. Watson, in 1921. It was found that the gas had a methane content varying between 20 per cent. and 79 per cent. A description was given of a small sludge pumping plant at Birmingham designed to give 25 b.h.p. for a working period of six hours daily. The gas was generated in suitable closed tanks and contained 43 per cent. of methane. A gas engine of ordinary type was used and developed 34 b.h.p. at 250 revolutions per minute on town's gas, whilst with sludge gas at 60-70 explosions per minute it developed 18 b.h.p. It was thence calculated that since Birmingham dealt with 400,000 tons of wet sludge per annum, and London with not less than 2,000,000 tons, there would be sufficient dry solid in Birmingham to generate 320 million cu. ft. of gas, equivalent on the basis of the experimental results of 16 million b.h.p. hours or 4,400 h.p. per day of 10 hours, and five times this amount in London. According to the method used for generating steam in coal fired plants, these figures would show for the combined sewage for Birmingham and London a saving of between 600,000 and 1,200,000 tons of steam annually, or roughly from 100,000 to 200,000 tons of coal.

The Birmingham Plant

Since these early experiments the utilisation of sewage gas has advanced rapidly and many plants are being put down for the purpose; in THE CHEMICAL AGE for March 17, we recorded an extension of the plant at Birmingham. So great is the interest in the utilisation of the gases that it is becoming the practice to adjust conditions for maximum gas evolution. Preliminary treatment of the sludge by the anaërobic alkaline fermentation process, for example, has as one of its principal advantages that it offers great possibilities as regards the utilisation of the gas liberated during fermentation. It has been laid down that the optimum conditions for methane evolution are a temperature of 26.7° C., an alkalinity of pH 7 or above, low moisture content, introduction of the fresh sludge in small amounts, and inoculation of the fresh sludge by mixing with a sufficient proportion of " seed " or digested sludge. In a paper before the Public Works Conference, 1933, Lowe gave the average results from

17 plants as being the generation of 0.827 cu. ft. of gas having a calorific value of 660 B.Th.U. per head of the population. At Birmingham advances have been made since the earlier experiments referred to previously, and Vokes in a communication to the World Power Conference, 1933, states that the sludge gas now has a composition of methane 69 per cent., carbon dioxide 29 per cent., nitrogen 2 per cent., and a calorific value of 685 B.Th.U. per cu. ft. From this gas, prior to the extension just announced, gas engines aggregating 950 b.h.p. were operated.

This utilisation of what twenty years ago was an entirely wasted product is one of the most interesting developments of technology and is in direct accord with the trend of modern industrial developments. On all sides the position of coal is being assailed wherever possible, and the problem of starting new industries in depressed areas to provide work for men who will never again be employed in the mines, become more pressing.

Agricultural Research

THE chemical industry cannot neglect agricultural research. That it does not do so is shown by the interest taken by Imperial Chemical Industries in practical field work upon artificial fertilisers. There is nobody in this country comparable to the Lawes Agricultural Trust at Rothampsted, and the future of that station must be of concern, not only to the agriculturalist, but to the whole of the chemical industry. The station was founded in 1843 by the Squire of Rothampsted, who maintained it at his own expense and endowed it at his death with £100,000 and the use of 100 years of the experimental plots. Rothampsted has since achieved world-wide fame as the home of scientific agriculture, and it is memorable to the chemical industry by virtue of the fact that its first great achievement was the discovery of artificial fertilisers and the consequent establishment of a new chemical industry which now produces some 35,000,000 to 40,000,000 tons of fertiliser annually. The practical experiments that followed from this discovery directed in recent years first by Sir Daniel Hall, and now by Sir John Russell, have so won the confidence of farmers that fertilisers have become an essential feature in the economy of agriculture in this country, enabling production to be maintained at a high level that is the envy of the world. Rothampsted therefore has thus a special call on the goodwill of the chemical industry because the organisation has not been content with discovering facts but has gone into the highways and by-ways of the countryside and by practical proof has compelled those who would otherwise have rusticated in ignorance to adopt the advances in practice which have been discovered experimentally. The fertiliser industry has thus had its path made smooth, without cost and without effort to itself.

The Future of Rothampsted

All this work is now in danger of being gravely interfered with by the ubiquitous, if necessary, builder. Much of the farm has already been "zoned" for houses. There is no longer any certainty of continuity of tenure, and when the original Lawes Trust grant of land expires, the land may have to be given up. It is not inconceivable that this might mean a stoppage of the work. It would certainly mean many years handicap, for agricultural experiments cannot be transferred without loss of value or time, and some of them would necessitate beginning again series extending over many years. An appeal has therefore been issued for a sum of £30,000 to enable the Trust to acquire both the land and the Manor House, and so to preserve "the oldest and best-known of all the agricultural stations in the world." We cannot doubt that a nation which finds itself able to find £100,000 to purchase the Codex Siniaticus, will not let £30,000 stand in the way of the continuance of such really useful work. Yet, despite our seeming confidence, doubts will persist. We have not forgotten the shortsighted policy which allowed the Empire Marketing Board to disappear; we cannot forget that the future of the Imperial Institute is yet unsecured. If private donors, such as the manufacturers of fertilisers and agricultural implements do not come forward in sufficient numbers, we commend this small sum to the Chancellor of the Exchequer as an investment for part of his budget surplus. It is an investment that will bear a rate of interest for the nation, as a whole, of usurious proportions!

Intra-Atomic Research

IF we have been constrained to gently ridicule some of the devotees of "heavy hydrogen," it is not that we desire to minimise the intrinsic importance of the discovery. The chemical and physiological properties of heavy hydrogen make it of peculiar interest, and some commercial developments have already occurred. These developments, however, cannot be extended to any appreciable extent until more is known of the reactions and possible uses of this monsterium. Lord Rutherford, congratulating the American discoverer recently, referred to "this new field of knowledge, which it is certain will prove of great scientific and practical importance in many directions in the near future." Meanwhile, Dr. Oliphant and Dr. Harteck, at the Cavendish laboratory, have come to the conclusion that there exists yet a third isotope of hydrogen half as heavy again as "heavy" hydrogen. It is suggested that when a diplon (the atom of heavy hydrogen) struck another diplon of helium a nucleus is formed; this helium nucleus, however, possessing superfluous energy, breaks up into two parts, one a fast proton and the other the new isotope of hydrogen. The helium nucleus, it is believed, can also break up into an isotope of helium and a neutron; the large number of neutrons observed when these experiments are performed is confirmatory evidence in support of this hypothesis.

Supplies of heat and power are limited, and further supplies cannot be secured once existing deposits have been used. We have about 1,000 years, possibly much less if power consumption continues to increase, in which to discover an alternative source. It has been suggested that one such source, inexhaustible in quantity, is the internal energy of the atom. Can we be sure that such energy really exists? If it exists, how can we tap it? Only by a thorough understanding of the internal structure and mechanics of the atom can we hope to answer these questions.

Rubber as a Chemically Resistant Material

Relative Importance of Soft Rubber and Ebonite

IN view of the frequent recurrence of rubber in recent discussions of new structural materials for chemical engineering, it is perhaps surprising to find that rubber was already used for such purposes more than one hundred years ago, in the earliest years of the rubber manufacturing industry, said Dr. D. F. Twiss when introducing his paper on "The Character of Rubber as a Chemically Resistant Material," at a joint meeting of the Chemical Engineering Group and the Birmingham Section of the Society Chemical Industry, held at Birmingham on March 23. It was in 1823 that Thomas Hancock patented the application of a mixture of rubber and pitch to ships' bottoms as a protection of the timbers (under the metal sheathing) against the ravages of worms. In his "Personal Narrative" written in 1856, he also describes the protection of iron, on ships, etc., from damage, by a sheathing of rubber 1-2 in. thick; the use of rubber gloves, aprons, hose, buckets, sink valves and washers for steam joints, and hard rubber (ebonite) stop-cocks, tubing, pistons and valves for use in chemical work. Concerning ebonite, Hancock states that the properties of this material are "resistance to the action of hot and cold acids, alkalis or chemically impregnated solutions, and sulphur in gas, and it is suited to any uses in which metals are objectionable."

Raw Rubber

Almost contemporaneously in the United States, Charles Goodyear, whose ventures into business were less happy than those of Hancock, described in his book "Gum Elastic" such articles as rubber and ebonite protected phials and demijohns, also ebonite sieves "highly useful for straining or cleansing articles or chemicals that corrode and destroy haircloth or wire sieve" and buckets. He further describes "enamelled ware" in which metal was coated with a smooth hard coating produced by concurrent oxidation and vulcanisation of a film of rubber *in situ*.

Raw rubber has a specific gravity near 0.92 and contains approximately 95 per cent. of the caoutchouc hydrocarbon $(C_5H_8)_x$ the remainder consisting mainly of protein substances and fatty acids in roughly equal quantities. It varies widely in tensile strength, some specimens exceeding 1 kg. per sq. mm. Its recovery after stretching is poor and the "permanent set" is marked. It exhibits remarkable resistance to abrasion where the mechanical load is light; sheets of unmilled raw rubber, therefore, afford effective protection to the inside of sand-blasting cabinets. On account, however, of the serious softening of raw rubber (especially after milling) with rise of temperature, its hardening or "freezing" at temperatures approaching 0° C., its susceptibility to physical attack by many organic liquids, and its very gradual absorption of a considerable proportion (up to 20 per cent.) of water, soft vulcanised rubber is generally preferred for constructional purposes. Nevertheless, ten years or so ago, prior to modern improved methods for attachment of vulcanised rubber to metal, wooden tanks lined with vulcanised Parà rubber were frequently used for storage of acids, particularly hydrochloric acid.

Soft Vulcanised Rubber

The vulcanisation of rubber leads to a great improvement in its mechanical qualities, particularly with respect to resistance to permanent deformation. The hardness increases continuously with progressive vulcanisation until with chemical saturation by sulphur the condition of ebonite is reached. Soft vulcanised rubber frequently exceeds a tensile strength of 2 kg. per sq. mm. and may stretch to 1,000 per cent. of its original length. Tensile strength in itself, however, is only of secondary importance for most chemical engineering purposes because where mechanical rigidity is demanded (*e.g.*, in a filter press plate) this can be provided by metal covered with rubber, the latter providing in addition to chemical resistance a degree of elasticity permitting deformation (*e.g.*, by thermal expansion) without rupture. Compounding with reinforcing agents, particularly carbon black, increases the toughness of the rubber and its resistance to mechanical stresses and wear and to solvents.

The "purer" and softer forms of soft vulcanised rubber show excellent resistance to abrasion, especially wet abrasion, under light loads, *e.g.*, for chute linings, sadblast cabinets, and pebble or ball mills. For heavier work, *e.g.*, for covering conveyor belts to carry coke, crushed ore, etc., and for lining tanks likely to contain irregular lumps of hard material, the abrasion resistance can be modified by using soft vulcanised rubber approximating to motor tyre tread quality; the especial feature of this is a considerable proportion of carbon black.

Resistance to Acids

Hydrochloric, hydrobromic, hydrofluoric and hydrofluosilisic acids of any concentration, sulphuric acid up to 50 per cent. and phosphoric acid up to 85 per cent. can be safely contained in soft rubber. With nitric acid the behaviour is less satisfactory. Practically all caustic alkalis and chemical salts in aqueous solution (other than those of powerful oxidising character, *e.g.*, chromates or persulphates, and for these ebonite can be used) can be used in soft-rubber lined tanks. With organic liquids the selection to be used with soft rubber needs to be made more carefully; many, *e.g.*, the hydrocarbon and halogenated solvents, oils (particularly hydrocarbons), and fatty acids rapidly swell soft rubber; it is a fairly safe rule, however, that for hydroxylic and water-soluble organic compounds selected soft-rubber "compounds" can be safely used, although for some, *e.g.*, acetic acid, it is desirable to use ebonite instead of soft vulcanised rubber. Such conditions as reduced pressures, rapidly fluctuating temperature or local differences in temperature are adverse to long life in protective rubber linings. It may be stated that for most purposes a temperature near 70 ° C. is considered desirable as a maximum; this is dependent, however, on many factors and in favourable conditions can be exceeded so that even boiling liquors have been successfully used in vessels with soft-rubber linings.

Ebonite or Hard Rubber

Of recent years the use of rubber-lined storage and rail tanks for acids, particularly hydrochloric acid, has extended rapidly, the advantages over the older carboy system of handling being numerous and fairly obvious. Hundreds of such tank wagons of capacity up to 8,000 gal. are now in use. Other industrial chemical equipment to which rubber linings have been satisfactorily applied include plating tanks, racks, and fittings; vats for dissolving scrap iron in hydrochloric acid, drums, centrifugals, and metal piping.

Fully-vulcanised ebonite or "hard rubber" consists of rubber combined with approximately 50 per cent. of sulphur corresponding roughly with the formula $(C_5H_8S)_x$. For special purposes it is further modified by compounding. Its sp. gr. is 1.15 or over, according to composition; tensile strength up to 8 kg. per sq. mm. The degree of hardness can be modified by variation in the degree of vulcanisation; hardening can also be effected by incorporation of mineral ingredients and eliminates any tendency to gradual distortion under tropical conditions. By suitable inert softening agents it is possible to some extent to increase the flexibility and consequent toughness; for this purpose, however, avoidance of all unnecessary mineral fillers is a useful first step.

Good ebonite is generally superior to soft vulcanised rubber in chemical resistance but not in resistance to abrasion or mechanical shock and it softens appreciably at temperatures below 100° C. On this account, and on account of its hardness at ordinary temperatures, it is consequently more open to mechanical damage than soft rubber and demands greater care in use. The general working temperature is below 65°C.; high proportions of mineral fillers can increase the temperature-resistance very considerably but generally results also in a tendency to greater brittleness. Its rigidity also calls for careful consideration of its expansion and contraction with variation in temperature; long pipe lines call for expansion

joints. Tanks lined with ebonite should be protected from sudden considerable temperature fluctuation. For such reasons tanks lined with ebonite sometimes have an intervening layer of soft rubber which serves to absorb the stresses set up by unequal expansion of the lining and the metal foundation. Another device is to use two layers of " soft " rubber with a sandwiched layer of ebonite. This three-ply construction provides the wear-resistance of the soft-rubber surface with the resistance of ebonite to the action of chemicals; and under-layer of soft rubber prevents undue stresses in the lining and permits more rapid variations in temperature.

A Wide Range of Equipment

Ebonite is applicable in and to practically all kinds of equipment; tanks, buckets, dipping baskets, centrifugal baskets, funnels, piping, fans, dyesticks, spools, pumps, taps, pipes, etc. It may be used alone or reinforced with fabric or metal or may merely provide a protective surface for equipment. Most solvents for raw rubber, however, have an appreciable swelling action on ebonite; neither soft rubber nor ebonite is therefore recommended for use with organic liquids such as ether, benzene, gasoline, or aniline. Its greater inertness, on the other hand, renders ebonite of particular value where a non-staining lining is required, *e.g.*, for fruit juices. Not only does the ebonite not stain on its own account but it resists absorption of colours from coloured liquids and so will not contaminate by imparting colour derived from previous contents. Soft rubber is not so satisfactory in this respect.

Many types of material have been proposed as " cements " for soft rubber. A prime coating of ebonite or ebonite solution on the prepared metal has often been applied as an effective method for securing increased firmness of attachment of a soft rubber sheet coating; the effectiveness of the ensuing bond is evident from the degree of attachment of rubber tread to steel band in a solid truck tyre. A solution of rubber, containing a high proportion of *p*-nitrosodimethylaniline, applied to the clean metal surface as a first coating also ensures greatly enhanced strength of adhesion of sheet rubber thereto (Eng. Pat. 352,080). Hæmoglobin also has been used, mixed with rubber (conveniently by dissolving in latex), in a primary adhesive layer for rubber to metal attachment. Another method is the coating of the steel foundation with a film of brass or other copper alloy—the composition is not unimportant—which becomes attached more firmly to the rubber. More recently this has been elaborated into the use of a preliminary application to rubber or metal of a solution of a metallic compound, *e.g.*, a copper soap, one part of the molecule of which provides firm attachment to the steel and the other to the rubber (Eng. Pat. 307,056 and 390,932).

Means for Good Adhesion

A further advance has been to render the rubber itself capable of stronger adhesion. This has been done, *e.g.*, by acting on the rubber surface with a halogen or halogen compound before application to the steel. A more satisfactory method still has been to use a new class of adhesive made from rubber (*e.g.*, Eng. Pat. 247,136 and 357,238), or a mixture of natural resins and rubber (Eng. Pat. 395,430). When a soft rubber compound is vulcanised in contact with a steel plate which has first been painted with a solution of an adhesive of this class, the bond between rubber and metal can be actually stronger than the rubber itself. At 100° C. the attachment is weakened, and a maximum temperature near 70° C. is advisable.

As an alternative to attaching rubber to metal it is sometimes possible, *e.g.*, in concrete structures to provide a special suitable surface to support and hold the rubber lining. The special surface (for tanks of concrete, wood, etc., and even metal) conveniently consists of a hydraulic cement to which latex has been added with or without rubber crump. The cement holds itself to the foundation on which it is spread and the exposed rubber particles on its surface provide anchorage for the rubber sheet which is subsequently applied (*e.g.*, Eng. Pat. 275,316). The attachment can be enhanced by suitable adhesive solutions of or for rubber.

Chlorinated rubber, now known under various proprietary names, *e.g.*, duroprene, tornesit, alloprene, has been known for many years as a chemically resistant material, patents for its production having been filed as early as 1859 (Eng Pat. 2734 and 2762). Many modifications in its method of production and of the characteristics of the product have been described, but the essential procedure for manufacture is the direct addition of chlorine to rubber, the latter being generally in solution. The chemical change is not merely additive, substitution also occurring so that the product may contain over 65 per cent. chlorine and approximate to $(C_5H_6Cl_4)_n$. It is surprisingly resistant to acid and alkali and solutions can serve as effective chemically-inert lacquers. It forms hard resistant and inflammable coatings which, however, are not extensible like rubber. On that account, although a thin surface film of chlorinated rubber can offer protection to an under-layer of rubber on which it is formed, mechanical stresses tend to crack the film and impair its action. A shortcoming of chlorinated rubber, however, is its insolubility in ordinary rubber so that it is not possible homogeneously to incorporate one in the other.

Duprene and Thiokol

The gap somewhat unexpectedly left unsatisfied by chlorinated rubber has lately been partially filled by a new synthetic rubber-like product containing chlorine; it is yet too soon to say how completely the requirements will be fulfilled. The new material " duprene " is a polymerised chlorobutadiene and has the composition $(C_4H_5Cl)_x$. It is not so resistant to organic solvents and oils as ebonite, although superior to rubber in that respect.

Thiokol, an ethylene polysulphide made by the interaction of ethylene dichloride and an alkali polysulphide, is another synthetic plastic material, has been produced commercially of recent years to combat the swelling action of organic solvents. Its resistance to the solvents which rapidly distend ordinary vulcanised rubber is remarkable, only carbon disulphide having any appreciable effect on it.

Chloropicrin as an Insecticide

A Revised Bibliography

THE United States Department of Agriculture has published a revised " Bibliography of Chloropicrin, 1848-1932," which was first issued in 1926. Copies may be obtained on application to the Superintendent of Documents, Washington, D.C., price 10 cents.

Chloropicrin or trichloronitromethane, CCl_3NO_2, was first prepared in 1848 by Stenhouse, who added an aqueous solution of picric acid to an excess of bleaching powder. It remained largely a laboratory curiosity until the world war, when it was used on a large scale in shells, both as a lachrymatory and a lethal gas. It was used chiefly because of its peculiar property of causing vomiting when inhaled, thus inducing the soldier to remove his mask and expose himself to the action of gases which could not penetrate the mask. Chloropicrin was generally mixed with other gases, especially phosgene and diphosgene. A mixture of 80 per cent. chloropicrin and 20 per cent. stannic chloride (later a mixture of silicon and titanium chlorides) was also used.

As early as 1907 chloropicrin emulsified in water with soap, was proposed as an insecticide by the Chemische Fabrikwerke G.m.b.H., of Austria. Tests with chloropicrin as an insecticidal fumigant were first made about 1917 by Moore, in the United States, and by Piutti and Bernardini, in Italy, and in 1918 by Bertrand, in France. The advantages of chloropicrin as a fumigant are high toxicity to many species of insects and rats; fungicidal and bactericidal properties; complete freedom from fire and explosion hazards; low solubility in water; ability to penetrate bulk commodities; non-reactivity with metals, fabrics, and colours under fumigating conditions; and a pronounced odour and lachrymatory effect which usually effectively warn of its presence. Its disadvantages are slowness in action, as compared to hydrogen cyanide; tendency to act detrimentally on living plants and seeds; difficulty in removing its odour from fumigated commodities and spaces; and nauseating effect upon the operator. The combination of chloropicrin with carbon dioxide, found by Cotton and Young to be more toxic than chloropicrin alone to many insects, should prove useful in fumigating stored materials.

Financial Position in the Chemical Industry

By S. HOWARD WITHEY, F.C.I.

THE report of the Gas, Light and Coke Co. for 1933 disclosed a reduction of £223,368 in the proceeds of the sale of gas, but meter rents and stove rents were higher at £402,162 and £680,861 respectively, the gross revenue for the year working out at £11,833,255, which figure compares with £12,114,573 in 1932. After charging general expenses debenture and other interest, the sum of £1,364,731 was available for dividends, the ordinary dividend being maintained at the rate of £5 12s. per cent. for the fifth successive year, and £186,129 carried forward after allocating £40,000 to the redemption fund.

Economies in production costs were reflected in the accounts submitted by Borax Consolidated, Ltd., and in spite of the retarding effects of tariffs, quotas and exchange restrictions, and the low level of prices, the trading profit and other income totalled £281,258 for the financial year to the end of September last, representing an increase of £7,852 in relation to the previous year's figure. After debiting administration expenses, fees, debenture interest, and the payment under guarantee in connection with the Tonopah and Tidewater Railroad bonds, the balance of net profit registered an increase of £1,975 at £89,743, and although no dividend was declared on either the preferred ordinary or the deferred ordinary shares, the carry forward was raised from £202,192 to £207,934, and prospects are much brighter. Registered in 1899, the company has an authorised share capital of £2,900,000, of which a total of £2,550,000 has been issued and paid up, composed of £800,000 in the form of 5½ per cent. cumulative preference £10 shares—the dividend on which took £44,000—£600,000 in 6 per cent. preferred ordinary £5 shares; and £1,150,000 in deferred ordinary shares of £1 denomination. There are also £1,000,000 of 4½ per cent. first debenture stock, and £1,500,000 of 4½ per cent. second debenture stock outstanding, and the former was recently quoted at 106, and the latter at 95.

Tanning Industry

In the leather industry, some firms sustained losses while others were able to increase profits during the past twelve months, conditions generally showing some improvement. A dividend of 3 per cent. was declared by the directors of Barrow, Hepburn and Gale, Ltd., the balance of net profit working out at £62,655, or an increase of £18,103 in relation to the 1932 figure. This dividend absorbed £7,875, leaving a credit balance of £36,760 to be carried forward, as against £22,481 brought in. In the case of C. W. Randall and Co., Ltd., the margin of gross profit for the year declined by £1,298 to £7,046, but after charging income tax, depreciation, fees, etc., and crediting profit on the sale of investments, the net figure was £12,743, representing an increase of £3,228, and enabling the ordinary dividend to be maintained at the rate of 25 per cent., and an increased balance to be carried forward to next account. This company was registered in 1926, and the paid-up capital amounts to £85,000, composed of £75,000 in the form of 8 per cent. cumulative participating preference £1 shares—the dividend on which takes £6,000—and £10,000 in ordinary shares of 1s. denomination. There is a general reserve of £20,000, and the floating assets aggregated £107,981. After debiting £8,326 representing loss sustained by subsidiary company, the account submitted by Baxter's Leather Co., Ltd., showed a deficit of £29,721, necessitating the passing of dividends and the transfer of £2,950 from reserve, a debit of £26,772 being carried forward to 1934, while the net loss of £1,145 sustained by George Angus and Co., Ltd., compares unfavourably with the profit of £2,173 realised in 1932.

A slight improvement was reported by Redfern's Rubber Works, Ltd., the audited account covering the twelve months to December last disclosing a net profit of £8,285, which figure compares with £7,398 realised during the preceding year. In 1918, the share capital of this company was increased from £80,000 to £200,000, all of which ranks for dividend, consisting of £80,000 in the form of 7½ per cent. cumulative "A" preference £1 shares; £40,000 in 7½ per cent. cumulative "B" preference £1 shares; and £80,000 in ordinary shares of 5s., and although the preference dividends absorbed £9,000, the ordinary shareholders received a distribution of 2½ per cent., thereby reducing the carry forward from £6,149 to £3,434. In addition to a general reserve of £27,000, there is an income tax reserve of £3,017, and a bad and doubtful debts reserve of £4,979, while floating assets were valued at £109,826 against creditors totalling £13,701.

During the year to the end of September, a trading profit of £26,501 was made by the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., thus registering an increase of £12,600, although the profit figure was arrived at before debiting a loss of £11,318 which was sustained at the Persan works. After charging this loss, and providing for debenture interest and asset depreciation, the debit balance amounted to £48,212. The deficit has been written down under the capital reorganisation scheme sanctioned by the Court.

Dyes and Dyeing

The profit of £1,740 realised by Bradford Dyers' Association, Ltd., during 1933, was arrived at after debiting debenture interest, and represents an improvement in relation to the 1932 result, although no dividend on the preference shares could be declared, the carry forward being correspondingly increased. Some improvement was also shown in the figures submitted by the English Velvet and Cord Dyers' Association, Ltd., the trading profit being £23,976, as compared with £18,387, before charging debenture interest and depreciation. The final result was a loss of £7,300, and by transferring £15,000 from the reserve it was possible to meet the dividend of 5 per cent. on the £211,886 of cumulative preference share capital, which accounted for £10,594, leaving £7,494 to be carried forward, as against £10,388 brought in from 1932. A setback was experienced by Fairy Dyes, Ltd., the margin of net profit for the financial year ended November 30 being only £10,867, necessitating a reduction in the rate or ordinary dividend from 12½ per cent. to 10 per cent., and therefore a reduction in the preference dividend from 10 per cent. to 7½ per cent. This company was registered in 1928, and has an authorised share capital of £100,000, all of which ranks for dividend, composed of £36,000 in the form of 7½ per cent. cumulative participating preference shares of £1—which rank for a further 2½ per cent. after the ordinary shareholders have received 10 per cent.—and £64,000 in ordinary shares of 5s. denomination.

Paint and Varnish

Under the heading of paint and varnish, a satisfactory increase of profit was reported by Blundell, Spence and Co., Ltd., the net balance being shown at £37,890, which compares with £26,627 realised during the preceding year. The rate or ordinary dividend was, therefore, increased from 3 per cent. to 5 per cent., and after allocating £8,266 to taxation account, and transferring £5,000 to the general reserve, a credit balance of £10,152 was carried forward, as against £10,071 brought forward.

An expansion of turnover, in conjunction with a reduction in expenses, is reflected in the accounts submitted by Evans Sons, Lescher and Webb, Ltd., the well-known wholesale druggists and manufacturing chemists, etc. The gross profit of £32,696 for 1933 compares with £23,541 in 1932, and at £16,270 the net profit registers an increase of £4,151. After paying half a year's preference dividend to December, 1930, and placing £10,000 to reserve, the carry forward is £3,040, or an increase of £830. The paid-up capital of this company totals £365,497, made up of £241,803 in the form of 6 per cent. cumulative participating preference shares, and £123,695 in ordinary shares, all of 6s. 8d. The audited account of Southall Bros. and Barclay, Ltd., disclosed an increase of £5,656 in profit, the net figure being £80,708, the rate of ordinary dividend being maintained at 20 per cent., while £50,000 has been allocated to a price reduction fund which is to be merged with the advertising reserve to give a total of £70,000.

The manufacture of cement has also been much more profitable, and in several instances dividends have been raised. During 1933, Oxford and Shipton Cement, Ltd., made a gross profit of £103,609, representing an increase of £1,553, while the net profit balance proved to be £34,017, which figure compares favourably with £31,568 revealed in the 1932 account. This enabled a distribution of 4 per cent. to be made to holders of the £450,000 shares of one class, as compared with 1½ per cent. paid a year ago, also the value of the Kirklington works to be written down by £15,500. Another kiln will commence manufacture in the near future, and it is anticipated that the drop in the price of cement will be offset by increased and more economical production. Although there was a decline in the margin of gross profit realised by British Portland Cement Manufacturers, Ltd., during the past year—the actual figure being £691,027, as compared with £731,037 in 1932—the amount allocated to depreciation account was £50,000 less, so that the net profit worked out at £357,056, or an increase of £9,744. This enabled the ordinary dividend to be maintained at 15 per cent. for the seventh successive year, and an increased balance to be carried forward to the next account. This company was registered in 1911, and is controlled by Associated Portland Cement Maenufacturers, Ltd., whose directors recommended a dividend of 7 per cent., less tax, on the ordinary shares, after debiting £387,150 under the heading of depreciation, and providing £58,484 for debenture stock sinking funds. Leeds Fireclay Co., Ltd., sustained a net loss of £26,519 during 1932-33, which contrasts with a net profit of £9,124 realised during the preceding twelve months, and reduces the credit balance to £3,319.

The Chemical Age Lawn Tennis Tournament

Arrangements for 1934: Early Entries Essential

ARRANGEMENTS have been completed for the fourth annual Chemical Age Lawn Tennis Tournament, open to all men engaged in any capacity, as principals or members of staffs, in the chemical industry in Great Britain. The hundreds of lawn tennis enthusiasts who have participated in the tournament in the past three years will be interested to learn that the arrangements are on the same lines as last year and comprise a doubles tournament for pairs, who must be members of the same or an associated firm, and a singles tournament. THE CHEMICAL AGE Silver Challenge Cups, one for the doubles and one for the singles, will be awarded, to be held jointly for twelve months by the winners and the firms they represent, and there will also be, as in previous years, smaller trophies to be presented outright to the successful players and runners-up, particulars of which will be published later in the season.

The last day for receiving entries for the 1934 Tournament is April 30, and intending competitors are urged to read the simple rules appended and to apply by telephone, post or in person for entry forms, without delay, to The Editor, THE CHEMICAL AGE., Bouverie House, Fleet Street, London, E.C.4.

The present holder of the Singles Cup is Mr. C. G. Copp, of Doulton and Co., Ltd., London; the Doubles Cup is held by Messrs. F. G. Hawley and J. Haines, of the Anglo-Persian Oil Co., Ltd., London.

A fair number of entries have been received from the provinces in previous years, and we would extend a more pressing invitation this year to those members in the provinces to send in their entries. It would greatly facilitate the area division in the earlier rounds if a larger number of competitors were entered from the country, so that the necessity of travelling to London could be eliminated until the semi-final and final rounds, and the provincial members would be able to meet their opponents as near home as possible.

The rules governing the Tournament are extremely simple and are given in detail below. As soon as possible after the closing date for the receipt of entry forms, competitors will be notified as to the result of the draw and the final date for the playing off of the first round. The first name drawn usually suggests immediately to his opponent a convenient date and place for the match and upon completion of the event the result, signed by all players (winners and losers), is posted by the winners in time to reach the office of THE CHEMICAL AGE, Bouverie House,, 154 Fleet Street, London, E.C.4, by the first post on the day after the final date given for the playing of the round. In the case of any dispute arising between the players the decision of the Editor of THE CHEMICAL AGE is taken as final. The Editor also has the right to scratch any players who do not play off their matches by the stipulated dates, or who fail to conform to the rules of the Tournament.

There is no entrance fee of any kind, but competitors will understand that they pay their own travelling expenses in connection with all matches.

Entry forms may be obtained on application to the Editor of THE CHEMICAL AGE, 154 Fleet Street, London.

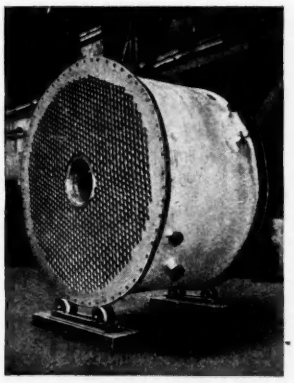
Entrants are reminded that several names were disqualified last year owing to their arrival a day too late for inclusion in the first round draw.

Rules

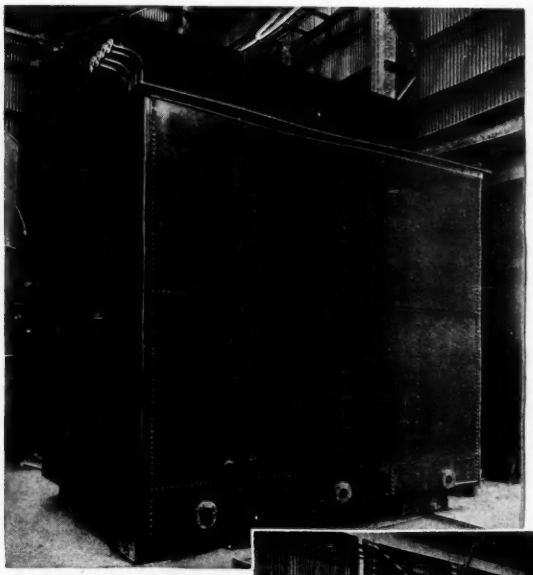
1. Every competitor must be a member of the chemical industry, either as a principal or a member of a staff. There is no entrance fee of any kind.
2. Each pair in the Doubles Tournament must be members of the same, or an associated, firm.
3. The Challenge Cups shall be competed for annually on courts of any surface in accordance with the Rules of Lawn Tennis and the Regulations of the Lawn Tennis Association. The winners of the Cups shall make arrangements for their safe custody and insurance.
4. The competition shall be conducted on the knock-out principle, and the best of three advantage sets shall be played in all matches, except in the Final of the Singles, when the best of five sets shall be played.
5. **Entries shall be made not later than April 30, 1934, and addressed:**

"Lawn Tennis Tournament,"
"The Chemical Age,"
Bouverie House,
Fleet Street, London, E.C.4.

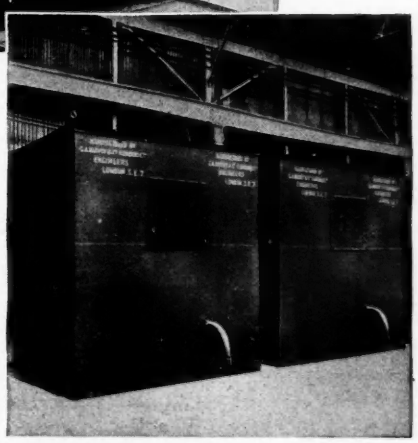
6. The draw shall be made on the first convenient day following the close of entries. The dates on or within which the several rounds must be played will be published in THE CHEMICAL AGE.
7. The Editor of THE CHEMICAL AGE shall have the right to scratch any players who fail to play off their matches by the stipulated dates, or who otherwise fail to conform with the rules and regulations governing this competition.
8. Except in the case of the special period set apart for the final stages of the competition, players drawn against each other must make their own arrangements for playing off their match on a court mutually agreed upon. In the event of disagreement, the first name drawn shall have the right to choose the ground.
9. In the general interests of competitors throughout the country it has been decided to divide into areas as far as possible all matches up to, and including, the Semi-Finals, the rule as stated under Clause 8, however, still standing.
10. The result of each match must be sent by the winners to the Editor of THE CHEMICAL AGE, signed by all players (winners and losers) immediately after the match, and must reach the office of THE CHEMICAL AGE not later than by the first post on the day following the final day for playing off the round.
11. If any player be not present at the agreed place or time of the match, opponents shall be entitled to a walk-over, after having allowed reasonable time (say, a maximum of one hour) for the others' appearance. If the players find it impossible to play off their match on the day originally chosen, they must play it on any other day, to which both sides agree, within the stipulated period.
12. Any dispute arising between players, or otherwise, shall be referred to the arbitration of the Editor of THE CHEMICAL AGE, whose decision shall be final.
13. While competitors will decide as to hard or grass courts for the preliminary rounds, it must be understood that the Finals will be played on courts selected by the Editor of THE CHEMICAL AGE.



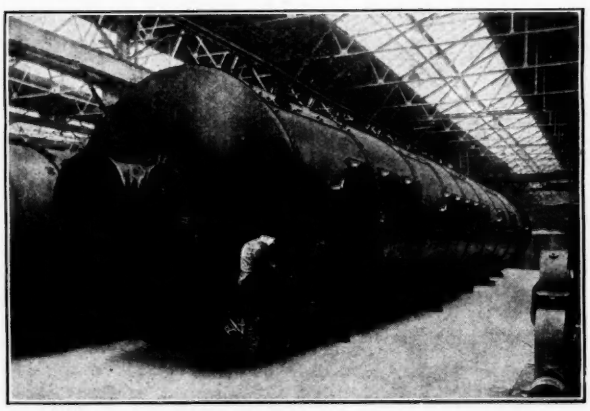
The welding of the 516 tubes into the tube plates of this calandria had to be carried out by a special process to avoid cracking the tube plates or shell under the welding stresses which were set up.



Oil-heating tank, 12 ft. deep, fitted with heating coils of solid drawn steel tubing.



Electrically-welded storage tanks, 10 ft. × 10 ft. × 12 ft. deep, fitted with internal strainers and coils for use in connection with grease extraction plant.



Above : Built for a leading firm of oil refining engineers, this large fractionating column is 11 ft. inside diameter and 75 ft. high. It is shown lying in the horizontal position, with the vapour take-off nearest the camera.

Right : These pressure filters were supplied for a water purification plant. The vessels were designed for a working pressure of 100 lb. per sq. inch, and constructed of $\frac{3}{8}$ inch mild steel plate, the top and bottom being $\frac{1}{2}$ inch thick.

British Chemical Plant Fabricated in Steel Plate

Reproduced by courtesy of G. A. Harvey and Co. (London) Ltd.

Notes and Reports from the Societies

Pharmaceutical Society

New Pharmaceutical Codex

DISCUSSING the new British Pharmaceutical Codex at a meeting of the Pharmaceutical Society of Great Britain, on March 13, Mr. C. E. Corfield said that during recent years changes of considerable magnitude had occurred in the practice of pharmacy and in science and medicine generally, and the codex had proved itself to be of ever-increasing value as a standard book of reference.

The need for a systematic revision of the book to justify the position to which it had risen was recognised by the council of the society in the formation of the Codex Revision Committee in 1930. Throughout the revision it had been borne in mind that the object of the codex was to provide a book of reference for pharmacists and medical practitioners, as well as a book of standards for drugs and preparations not included in the British Pharmacopoeia. In consequence the scope of the codex had been enlarged.

One of the principal features of the new book was the inclusion of a series of requirements and tests under the heading of "standard," which provided for manufacturers, producers, and all engaged in the preparation of medicaments a more uniform standard than had been available hitherto for compounds and preparations not included in the British Pharmacopoeia. The pharmacological action, therapeutic uses, and other matter included, as previously, in the section of the monograph on "action and uses" had been revised in the light of modern knowledge. The pharmacological index had been revised and modified considerably. It had been thought advisable to discontinue the inclusion of a general index of drugs based mainly on their therapeutic uses and on diseases, and to replace it by a list based as far as possible on pharmacological principles from which the prescriber or student might obtain useful information.

The index of proprietary substances was an important feature of the book. It contained many substances which were only met with in commerce or used in medicine under registered or proprietary names.

Society of Dyers and Colourists

Annual Meeting

PROFESSOR ARTHUR G. GREEN, F.R.S., was elected President of the Society of Dyers and Colourists, in succession to Mr. Thorp Whitaker, at the annual meeting of the Society on March 15. In 1917 Professor Green was awarded the Perkin Medal of the Society of Dyers and Colourists for his discovery of Primuline and other dyestuffs. He was awarded the Dyers' Company Research Medal in 1909 and won it again, in conjunction with collaborators, in 1914 and 1923; on the last occasion it was for the discovery of the Ionamines.

Mr. Thorp Whitaker, the retiring chairman of the Society, was one of the founders and has always been actively concerned with its work.

Other officers elected at the annual meeting were:—Vice-presidents, W. H. Pennington, J. Denton and A. Silverwood; hon. treasurer, H. Jennison; members of council, F. Smith, F. E. Craven and R. B. Brown; hon. secretary, George G. Hopkinson; and hon. patent agent, H. E. Potts.

The Society's Gold Medal is this year awarded to Professor F. M. Rowe, for exceptional services as editor of the Colour Index, 1924, and its Supplement, 1928.

Huddersfield Section : Textile Chemicals

DYESTUFF manufacturers are now tending to turn part of their attention to other fields and are applying the research experience and manufacturing technique which they have developed to other products than coal tar derivatives, said Mr. C. Dunbar, M.Sc., Ph.D., in a lecture to the Huddersfield Section of the Society of Dyers and Colourists, on March 20. Many substances, other than dyestuffs, which are of interest to the textile trade have already been brought to light, and there is every prospect of many others being discovered in the near future which will allow of great improvements in dyeing and finishing technique.

Sulphonation is a process which enters into the manufacture of many dyestuffs, the reason being that it renders them capable of being dissolved in water. Several chemicals for dyeing and finishing are produced by sulphonating oils and fatty bodies thereby rendering them soluble in water. By this means it is possible to produce a variety of substances which exhibit powerful wetting emulsifying, dispersing, and cleansing properties, and which may also be used to give softness to textiles in finishing. Perminal W is an example of a sulphonated product which exhibits high wetting out properties; Lissapol A is an example of the sulphonated or sulphated fatty alcohol type of product. The latter is a most important development, since these substances possess powerful cleansing properties. The type of fatty alcohol on which the product is based, the amount of free fatty matter present, the position occupied by the sulphate group in the molecule and as to whether the product is a sulphate ester or a true sulphonic acid are factors which influence the properties of the product. By means of the better quality commercial sulphated fatty alcohols, it is more possible to scour under neutral conditions which is a great advantage in certain operations (examples being given) in the textile trade. Their stability in the presence of hard water and acids enable them to be used with safety under conditions where older products were either incapable of application or were liable to lead to the development of faults.

These discoveries have stimulated chemical manufacturers to further efforts. Entirely new substances are being introduced and if progress is maintained it is not inconceivable that there may be great changes in dyeing and finishing methods in the next few years, which would form a historical parallel to the changes which took place when synthetic dyestuffs replaced the natural dyestuffs. Examples of recently introduced products are Fixanol, Perminal NF, Lissolamine A and Lissolamine V, which are manufactured by Imperial Chemical Industries, Ltd. Fixanol has the property of combining with direct cotton colours with the effect of greatly improving their fastness to water, perspiration and acid-cross dyeing. The method of application is simple, since it consists in an after-treatment of material dyed in the normal manner with direct cotton dyestuffs with a cold or slightly tepid solution of Fixanol in water for a few minutes, followed by rinsing. The improvement in fastness to cross-dyeing is interesting, since it enables the cotton in unions to be burl dyed first, then fixed, followed by cross-dyeing of the wool. An increased margin of safety against the possibility of felting is also allowed by using Perminal NF in the dyeing and wet treatment of wool.

The Lissolamines are stripping promoters. At times it is necessary to strip the colour from dyed material and the demands for fast dyestuffs have necessarily been attended by great difficulties in stripping such colours from textiles without injuring the latter. Lissolamine A promotes the stripping of azoic colours, and Lissolamine V promotes the stripping of vat colours. These new introductions give means for stripping colours which have previously been impossible to remove effectively.

British Association of Chemists

Liverpool Section : Annual Meeting

THE annual meeting of the Liverpool Section of the British Association of Chemists was held on March 28, under the chairmanship of Mr. H. P. Mintor, when the following were elected officers for the ensuing year:—Chairman, Mr. Leonard Wild; vice-chairman, W. Mansbridge and T. L. Looker; hon. secretary, A. Betton; hon. treasurer, Dr. F. W. Kay; committee, Professor E. C. C. Baly (ex-officio), H. P. Minton, M. Rosebery, W. S. Reid, J. W. Crabtree, T. E. Fore, G. S. Irving, C. A. Wilde and D. W. Beesley.

In the course of his report, Mr. A. Betton, the hon. secretary, remarked that they had gained sixteen new members, equal to last year's figure, but through resignations, transfers, suspensions and two deaths, the total membership had decreased from 176 to 171. A number of the new members were a result of the membership campaign undertaken during the year. After referring briefly to the honorary students scheme, Mr. Betton remarked that Mr. C. A. Wylie had filled the position of trustee created by the loss of Dr. G. Tate and Mr. J. W. Crabtree had been elected to the Finance Committee. Mr. M. Moseley had joined the Nominations Committee, which dealt with over 190 applications during the year ending on September 30.

Liverpool had also been fortunate in having Professor E. C. C. Baly, the president of the Association, as a member of the committee. In addition to his work, he delivered a lecture on "The Synthesis of Sugars from Carbonic Acid by the Action of Light" at Liverpool in November, when members of the Society of Chemical Industry were also present.

Institute of Fuel

Alteration to Programme

THE meeting of the Institute of Fuel, arranged for Wednesday, April 11, at which a paper was to be presented by Dr. J. L. Pearson, G. Nonhebel and H. Ulander, entitled "Economic Flue Gas Scrubbing: Plant for the Efficient Removal of Dust and Sulphur from Flue Gases," has had to be postponed until November next, as it is not possible at the present time to give as much information as the authors desire to put before members.

The next London meeting will, therefore, be held on Wednesday, April 25, at the Institution of Mechanical Engineers, Storey's Gate, St. James' Park, London, S.W.1, at 6 p.m., when Dr. Adolph Meyer of Brown, Boveri and Co., Baden, will present a paper dealing with the development and use of the Velox boiler.

The annual corporate meeting of the Institute will also be held on April 25.

Institution of Chemical Engineers

Generation and Usage of Steam

A JOINT meeting of the Institute of Chemical Engineers with the Institute of Fuel and the Chemical Engineering Group will be held at the Chemical Society's Rooms, Burlington House, Piccadilly, London, on Wednesday, April 18, at 6 p.m. The President of the Institution, Mr. W. Macnab, will occupy the Chair, and papers will be read on "The Economic Generation of Steam in Chemical Works" (Mr. F. H. Preece, A.M.Inst.C.E., A.M.I.E.E., and Mr. B. Samuels, M.I.Mech.E., M.Inst.F.), and "The Economic Usage of Steam in Chemical Works" (Mr. W. F. Carey).

Society of Chemical Industry

London Section

THE next meeting of the London Section of the Society of Chemical Industry will be held on April 9, 1934, at 8 p.m., at the Chemical Society's Rooms, Burlington House, when a paper will be read by Miss M. Oliver and Mr. Theodore Rendle on "A New Problem in Fruit Preservation." By the courtesy of the Committee of the Chemical Club, members of the Section may dine at the club before the meeting; any member desiring to use this privilege must advise the hon. secretary in advance.

Outlook for United Kingdom Trade with Egypt

Increased Imports of Chemicals

SOME useful suggestions for United Kingdom manufacturers and exporters interested in trade with Egypt are contained in a report on "Economic Conditions in Egypt," by G. H. Sellous and L. B. S. Larkins, Commercial Secretaries at Cairo, issued by the Department of Overseas Trade (H.M. Stationery Office, 4s. net). Dealing with the extent and probable development of the demand for British goods, the authors state that United Kingdom manufacturers in general do not appear to send factory representatives sufficiently often to Egypt to study the needs of the market. United Kingdom manufacturers who are interested in Egyptian Government contracts particularly appear to fail to realise the necessity of sending representatives to Egypt. They rely too much on their agents and thus lose the opportunities so avidly and constantly seized upon by their Continental rivals of making personal contact with Egyptian Government officials. Experience has shown that often such visits have been the prelude of new connections or of wider business as these representatives have been able to bring to the knowledge of the officials concerned technical particulars of their wares which are often taken into consideration when selection has to be made between qualities of goods in relation to prices quoted. It is suggested that at least one visit a year to Egypt is required.

Question of Competitive Prices

The question of competitive prices introduces a controversial point, for it is contended that United Kingdom manufacturers have lost their market through a certain laxity in developing sales when favoured by an exchange of some 30 per cent. to 40 per cent. below gold standard countries. The result has been that consumers accustomed to use inferior goods have forgotten, in many cases, that United Kingdom articles are usually superior in quality and durability. It therefore seems all the more necessary for United Kingdom manufacturers to make a renewed effort to "push" their sales and to advertise freely during the current year. Many United Kingdom firms ask payment in the United Kingdom cash against documents, whereas foreign competitors are still allowing liberal credit terms to approved clients.

There is room for improvement in the methods of marketing adopted by many United Kingdom firms. Instances could be cited where important United Kingdom firms prefer not to appoint a local agent who would look after their interests, develop their sales, watch their collections, advise them in regard to advertising, methods of marketing, etc., with the result that ground has been lost to their more resourceful rivals. Egypt, in common with all other countries, has suffered from the world financial and economic depression, but she has, at the same time, suffered on the whole, to a less extent than most other countries.

The Need for Propaganda

For reasons of economy advertising by all countries was considerably restricted during the year under review and while it is not suggested—in these days of stress—that any comprehensive advertising campaign should be indulged in, it would seem, nevertheless, that more widespread commercial propaganda on well judged lines should be encouraged. It is essential that literature and catalogues should be issued in French and Arabic as well as in English; so long as trade literature is not issued in the language (French) that is understood by the largest literate section of the people, little profit can be expected from much of the literature that is at present sent to agents. Foreign firms do not hesitate to expend large sums in publishing literature describing their lines and their advantages and even in the case of an Egyptian Government tender a neat pamphlet printed in

Arabic attached to the tender is a great asset in conveying to the competent officials the advantage of the article offered.

Total imports of chemicals and pharmaceutical products during 1932 amounted to a value of £E.532,163 (the Egyptian pound equals £1 os. 6¼d. at par) compared with £E.524,206 in 1931. France remained the most important supplier of medicines and pharmaceutical preparations with an import valued at £E.72,645 (compared with £E.82,969 in 1931) out of a total import from all sources valued at £E.174,606. The United Kingdom remained France's nearest competitor with £E.39,734 (£E.45,458 in 1931) and Germany remained in the third position with £E.26,477 (£E.25,476 in 1931). The United States of America and Italy followed with £E.14,481 and £E.11,182 respectively. Germany and the United Kingdom tied for the first position in the market for miscellaneous chemical products. Out of a total import valued at £E.45,818 (£E.46,823 in 1931) Germany furnished to a value of £E.13,463 and the United Kingdom £E.13,453, but whereas the latter's trade declined by about £E.700, the former's increased by over £E.1,000.

Imports of Dyestuffs

Imports of artificial indigo amounted to 184,806 kilos valued at £E.23,968, compared with 95,723 worth £E.11,661 in 1931. Of this trade the United Kingdom obtained one-third of the volume and almost half the value, viz., 61,079 kilos valued at £E.10,021, while on the other hand the German volume of trade accounted for 89,893 kilos though the value of that country's contribution was only £E.9,725. German and United Kingdom imports in 1931 were 52,955 (£E.5,634) and 26,253 (£E.4,182) respectively.

The United Kingdom obtained a good share of imports of coal tar dyes, her contribution being 60,351 kilos valued at £E.11,946 out of a slightly increased total import of 154,992 kilos worth £E.46,268. United Kingdom imports increased by 20,999 kilos in volume and £E.4,980 in value compared with 1931. Germany's share of the trade was 52,686 kilos valued at £E.24,415 compared with 71,748 kilos worth £E.18,151 in 1931. Italy came next in order with 20,245 kilos valued at £E.4,233 representing an increase of 7,495 kilos in volume and £E.2,352 in value compared with the previous year. The incidence of the high import duties (15 per cent. *ad valorem*) on "packed blue" dyes have seriously affected a stable United Kingdom industry.

Chemical Fertilisers

The most striking feature in the Egyptian trade of chemical manures in 1932 was the heavy decline in imports of Chilean nitrate of soda. Whilst for a period of eight years such imports never came below 121,835 tons (1924) and one year reached even 193,125 tons (1929), the 1932 figure was only 77,122 tons. This was partly but not fully made up for by increased imports of other nitrates. Nitro-chalk from the United Kingdom thus more than doubled the import figure for 1931 when 10,161 tons were imported as against 24,365 tons in 1932 and the Germano-Norwegian nitrate of lime increased imports from 68,819 tons in 1931 to 82,094 tons in 1932, whilst the United States of America increased their imports of calcium nitrate to 7,956 tons in 1932.

The imports of sulphate of ammonia also show a marked increase in 1932 when they reached 9,202 tons, a figure unsurpassed since 1920 with the one exception of the year 1925 (when imports of sulphate of ammonia were 9,565 tons), whilst in no other year since 1920 did they exceed 5,000 tons. In 1932 the United Kingdom was the main supplier of sulphate of ammonia with 4,896 tons.

The decline in the total imports of chemical manures in 1932, as compared with 1931, is undoubtedly due to the heavy fall in the price of agricultural produce in Egypt during 1932, especially for cereals, onions, beans and vegetables. Cottons, on the other hand showed a slight price improvement over 1931. The winter crops (cereals) have always in Egypt been the main outlets for nitrogenous manures, whilst cotton, although the main crop of the country and even at present prevailing prices the most profitable one, takes less nitrates, and indeed the tendency seems to restrict the application of nitrogenous manures for cottons. Superphosphate. which is not of direct interest to United Kingdom trade in Egypt, and which is now mainly imported from Greece and Algeria, has suffered a severe setback during the last two years.

The Cleaning of Producer Gas

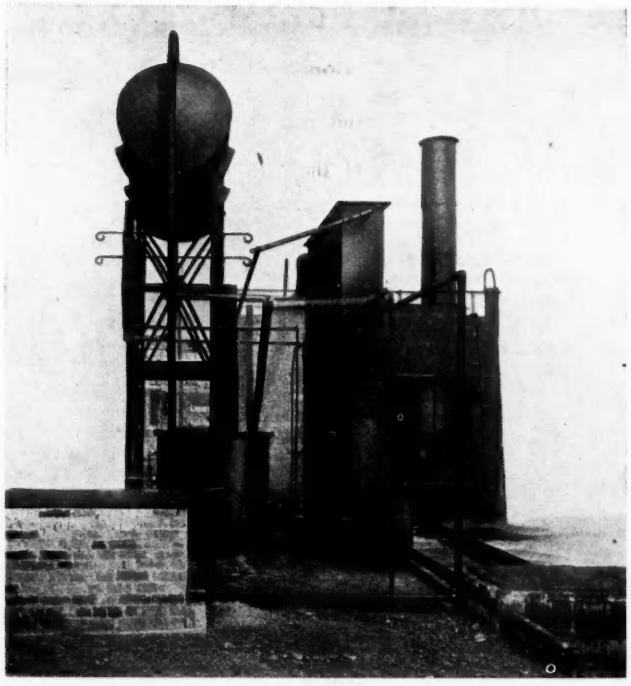
Efficiency of Electrostatic Methods

In many industries producer gas is used direct in the hot and dirty condition, without any purification. This has the advantage of utilising the sensible heat, but the disadvantage of a high dust content, especially with the modern types of completely mechanical producer. In many cases, however, the producer gas plant is situated some distance from the furnace settings, and this results in considerable deposition of dust, as well as air cooling, with separation of tar. Nevertheless, under normal circumstances, the best practice is to cool and clean the producer gas, the loss of the sensible heat being more than compensated for by the saving of the serious troubles involved in cleaning large pipe circuits and valves at relatively short intervals, and also the inefficiency of burners due to local stoppages by dust or tar. In addition, the cooling and cleaning of producer gas enables completely automatic temperature control by thermostats to be installed at the furnaces, because of absence of burner troubles.

For cleaning producer gas the electrostatic method is of great importance, especially in view of the advances that have been made in the "Lodge-Cottrell" system due to the active co-operation and the pooling of patents and experience by the respective companies in Great Britain. Germany and the United States. The total energy consumption is now only 7-8 Kw. per 1,000,000 cu. ft. of producer gas, with a figure of 99.5 per cent. dust removal efficiency or over, irrespective of the size of the dust particles, even when below 10 microns, while attendance charges and maintenance costs are negligible. It is also possible to separate the dust direct from the very hot dirty producer gas (containing no separated tar), since electrostatic methods will operate almost irrespective of any temperature that is reasonably likely. The capital cost of the plant is, however, greater since hot gas has an extremely large volume, while under relatively high temperature conditions the time required for the separation of dust is somewhat greater than in the ordinary cold conditions.

When producer gas is lowered in temperature, with deposition of tar, the most scientific method is to install electrostatic separation plants in order to give a clean gas entirely free from dust, preceded by the ordinary types of water-cooled condensers and scrubbers. This has the advantages of giving a reduction in the volume of gas and therefore the size of the electrostatic installation which is necessary. Further, the installation removes the water particles as well as the dust and tar.

It will be remembered the basic principle of the "Lodge-Cottrell" system is the use of plates or pipes, constituting a series of earthed collector electrodes. In the narrow spaces between these plates or in the pipes, hang wires or rods with numerous points, forming discharge electrodes, which are coupled to very high tension direct current supply at 60,000 to 70,000 volts so that brush discharge takes place. As a result the dust particles in the gases, which pass through the ducts or pipes, are electrified, and repelled against the earthed collector electrodes, which are equipped with motor driven rapping hammers. Over 3,000 electro-filters in various fields of application are at work in Great Britain and Europe. In addition to dealing with producer gas, blast furnace gas and coke-oven gas, they are working in conjunction with metallurgical furnaces, cement works, and steam boiler plant, especially where pulverised fuel is in use.



Clayton's patent "Cascade" Tar Distillation Plant. Installation at the Bournemouth Gas & Water Co.

There is no substitute for experience

Synthetic chemicals are being discovered for many good old-fashioned commodities, but there never can be any substitute for experience; the supply is limited.

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Fine Chemical Workers' Wages

National Ballot Results

THE National Executive Council of the Chemical Workers Union has now reported the result of the ballot on new agreement terms, taken among such members employed in 67 of the principal firms in the drug and fine chemical trades with factories in London, Bristol, Derby, Hull, Manchester, Leeds, Newcastle, Bradford, Birmingham, Glasgow, Edinburgh, Aberdeen, Liverpool, Brighton, Sheffield, Hitchin, Watford and Coventry.

Fully 78 per cent. of the members concerned returned their voting papers, and this was larger than expected. Members voted on two clear questions:—(a) Adoption of new terms (voting, 17 to 1 in favour); (b) application to be made direct to each firm as against applying to any groups of federated firms (voting, 15 to 1 in favour). As more than a 75 per cent. majority required under Union rules was secured, the Union's Executive Council at their April meeting will now proceed to apply to the firms involved who employ approximately 20,000 workers, male and female, to accept and operate the new agreement as the Union's standard terms.

Abstract of New Terms

	New.	Existing.
Hours (per week)	40	48
Overtime (Normal)	1½	1¼ first 2 hrs.
Sundays and holidays	Double	Double
Holidays (Annual)	12 days	6 days
Wages:—Foremen	100s. per wk.	No fixed rate
Forewomen	50s. ,, ,,	,,
Charge Hands (male)	90s. ,, ,,	,,
(female)	45s. ,, ,,	,,
Adult males Grade I.	80s. ,, ,,	Grade I. 60s.
,, ,, ,, II.	70s. ,, ,,	,, II. 55s.
		,, III. 50s.
,, females ,, I.	40s. ,, ,,	,, I. 34s.
,, ,, ,, II.	35s. ,, ,,	,, II. 28s. 6d.
Junior males	14s. to 60s. per wk.	11s. 6d. to 36s.
,, females	14s. to 30s. ,, ,,	11s. to 25s.

Other new proposals include the filling of scheduled poisons by adults only; limitation of juniors employed 1 to 4 adults; restricted work for females; compensation payment equal to 2 weeks' wages for each year of service, if and when discharged owing to re-organisation (misconduct not involved); and payment for sickness (28 days each year on production of medical certificate).

German Nitrogen Cartel

Erection of New Nitrogen Plants Prohibited

THE recently reconstructed German nitrogen cartel was endangered when one of its members, the Gewerkschaft Ewald, served notice of termination of its membership in the cartel as from June 30, 1935. This company contemplated a substantial expansion of its plant regardless of the large excess capacity already existing in the German nitrogen industry, which is now operating at 35 per cent. of its capacity.

In order to prevent what the present Government considered a malinvestment of capital, the Federal Minister of Economics has, in virtue of the Cartel Law of July 15, 1933, which was published on January 26, 1934, prohibited the erection of new nitrogen plants in Germany. It was stated that Ewald had let contracts for a third unit to cost 4 or 5 million marks for completion July 1, 1935, with a capacity of 23,000 tons nitrogen. The existing two units, which have a capacity of 22,500 tons nitrogen, cost 20 million marks.

This prohibition will be effective till June 30, 1940, until which date the nitrogen cartel, which now controls 100 per cent. of the German production, has been prolonged. The prohibition applies to the production of synthetic ammonia and to calcium cyanamide. According to the United States Trade Commissioner at Berlin it is forbidden to erect new plants for the manufacture of these products or to increase the capacity of existing plants.

Conditions in the Belgian-Congo

Radium and Petrol Production

THE years 1929 and 1930 saw the peak of prosperity in the Belgian Congo, but at the end of 1932 the situation had become one of almost overwhelming economic and social difficulty. Trade in that year decreased by nearly half as compared with 1931, while industrial production decreased by more than half. As a result there was an urgent need for drastic redressment, financial, commercial and administrative. This is being tackled in a courageous manner. At the same time production is being fostered by a system of subsidised freight rates and other transport facilities, while various other steps have been taken to favour and protect commerce.

In a report on economic conditions in the Belgian Congo, issued by the Department of Overseas Trade (H.M. Stationery Office, 2s. 6d.), Mr. H. C. Swan, British Consul-General at Leopoldville, states that the Union Minière of Katanga (at its Chinkolobwe Mine) is the sole producer of radium in Belgian Congo, which is the prime producing country of this ultra precious metal. Of the total stock of the entire world at the end of 1932 (550 grams) 350 grams were produced from the works at Oolen, Belgium, where the Katanga uranium is treated. Production for 1932 has not yet been reported, but it was kept at a minimum not to upset the market unduly.

Considerable concern is felt locally at the reports of recent developments in the uranium deposits of Canada, which it is feared may challenge Belgian Congo predominance in this field and further reduce the price level, already fallen from £25,000 to £13,000 sterling (gold).

The production of cobalt has been deliberately stopped during the past two years in order to help stabilise the market for this product, of which the Belgian Congo is also the principal supplier, with Canada in the second place. The total average consumption is calculated at about 1,000 tons and in 1930 no less than 1,202 tons of copper cobalt alloy were produced in the Katanga against 750 tons in 1925.

Seepages of bitumen have been discovered at Lake Albert and in the Semliki Valley, Tanganyika, both on the Belgian and British sides, but it is feared that any oil deposits which may exist will be at such a depth as to make drilling a hazardous and expensive venture. The importation of petroleum entered into a new phase last year with the erection and installation of Petrocongo's cracking plant capable of a daily output of twelve tons. Twelve million litres of motor spirit were produced in 1932. Tanks with a storage capacity of from 100 to 500 cubic metres have been erected.

The Petroleum Bill

"The Independent" Reviews the Position

REFERRING to the Petroleum (Production) Bill, which was introduced in the House of Lords on March 22, "The Independent" of March 31 congratulates "the industrious civil servant who has discovered this neglected opportunity for official activity, muddle and expense," for "it is not often that Parliament having once given its attention to a particular commodity leaves the thing alone for so long a period as sixteen years. In the ordinary way an Act of Parliament produces an amending Act within a couple of years and sometimes even more rapidly. Had petroleum served Whitehall as well as coal or houses we should by now have had half a dozen complicated Acts of Parliament and a great Petroleum Department with appropriate and expensive offshoots.

"In 1918, before the end of the war, an effort was made to find petroleum on this island. The idea, very proper in those days, was that if oil could be found it might help us to win the war. We therefore passed an Act. In 1918 Parliament was ready to pass any Act if it was offered in the interests of the war. We appropriated to the nation any oil that might be found under our soil, a provision with which a great many people will be found to agree. But, as always happens, the only effect of this Act has been to discourage private enterprise in its search for petroleum, so now the Government is going to get busy about the matter."

News from the Allied Industries

Artificial Silk

A RECEIVER AND MANAGER of Alliance Artificial Silk, Ltd., of Norwich, was appointed by Mr. Justice Crossman in the Chancery Division on March 27, on the motion of Mr. Upjohn, who represented a prior lien debenture-holder for £30,000. Trustees for second debenture-holders, at whose request Mr. Justice Clauson appointed a receiver of the company last week, were represented by Mr. Harman and Mr. Buckmaster. Mr. Rabagliati, for the company, consented to the appointment. Mr. Justice Crossman said that on the evidence there was a case for the appointment, and the receiver and manager would be given liberty to act at once.

Cement

THE BRITISH AND ALLIED INVESTMENT CORPORATION, LTD., acting on behalf of, and in conjunction with, an influential syndicate, has made an offer to acquire not less than 70 per cent. of the issued share capital of Oxford and Shipton Cement, Ltd., at 28s. per £1 share, plus an amount equal to 4 per cent. per annum, less tax, calculated on the nominal amount of such shares, from January 1, 1934, down to date of payment. The Oxford company's capital is to be increased by £200,000, to £700,000; £300,000 of 4½ per cent. debenture stock will also be created. The company will acquire the 280,000 ordinary shares of the Alpha Cement Co., Ltd., by exchanging one fully-paid £1 share of the company for two ordinary shares of 10s. each of the Alpha company. The 110,000 7 per cent. preference shares will be acquired at 22s. 6d. per share, plus a sum equal to 7 per cent. per annum, calculated on the nominal amount of such shares from August 1, 1933, to date of completion, payable in cash. Sir Felix Brunner, Bt., will remain on the board and Viscount Dillon, Colonel E. F. Dillon, Mr. H. S. Wilson, and Mr. F. R. Allen retire. To compensate the retiring directors, 27,500 shares will be issued to them for cash at par. These shares will be acquired by British and Allied Investments Corporation at 28s. per share, and the difference of £11,000 will be divided as to £2,500 to each retiring director and as to £1,000 to Sir Felix Brunner for loss of office as managing director. It is proposed to appoint Mr. Albert Y. Gowen, of the Alpha Cement Co., as the new managing director.

Safety Glass

LANCEGAYE SAFETY GLASS, LTD., have now gone into liquidation and a new company has been registered under the name of Lancegaye Safety Glass (1934), Ltd., to take over the business. Shareholders in the old company have been offered one fully-paid 1s. share and two 1s. shares, 6d. paid, in the new company for every three shares held. The liability on the partly-paid shares is payable as to 3d. per share on application and 3d. on allotment. The shares have all been underwritten and the company states that it will have sufficient capital to carry on and increase the business. The board of the new company consists of Mr. M. Gordon Liverman, J.P., who was the late chairman, Mr. C. W. Wrey and Mr. C. W. Latham, the latter being a director and shareholder of the London Finance Trust, Ltd., which has guaranteed subscription of the partly-paid shares.

Iron and Steel

THERE WAS A DIFFERENCE OF OPINION upon the appointment of a liquidator for the Darlington Rustless Steel and Iron Co., Ltd., at the statutory first meeting of creditors and shareholders held on March 27. A vote was taken, and the chairman announced that the result would be declared in due course. A draft statement of affairs of the company was submitted to the meeting showing the position as at July 8, 1933, when a receiver was appointed by the company's bankers. The accounts show total liabilities £213,214, of which £201,836 is expected to rank against net assets £183,876, and a deficiency of £232,074 with regard to contributories. The failure of the company was attributed to inability to obtain working capital to finance a steadily increasing demand for its productions and to other causes.

REFERENCES TO THE STIMULATING EFFECTS of tariffs on the iron and steel trade were made at the annual meeting of John Baker and Bessemer, Ltd., at Rotherham, on March 29, when Mr. J. W. Baker (chairman of the board) said that last year was the first complete year during which the benefits of protection against foreign competition were enjoyed, and while the imports of iron and steel into this country had declined by over 40 per cent., there had been a great increase in this country's production. Firms were finding that their exports of iron and steel were being increased.

Inventions in the Chemical Industry

Patent Specifications and Applications

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

DESTRUCTIVE HYDROGENATION of coal and allied carbonaceous materials.—L. Horton, J. G. King, and F. A. Williams. Sept. 21, 1932. 407,400.

SODIUM NITRATE, process for the manufacture.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Dec. 23, 1931. 407,311.

SODIUM NITRATE and calcium chloride, production.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Feb. 4, 1932. 407,312.

POTASSIUM NITRATE, process for the manufacture.—Norsk Hydro-Electrisk Kvaelstofaktieselskab. Feb. 23, 1932. 407,313.

POTASSIUM NITRATE and calcium chloride, production.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Feb. 23, 1932. 407,314.

LUBRICANTS and process for the manufacture and production of the same.—J. Y. Johnson (I. G. Farbenindustrie). June 10, 1932. 407,379.

PRODUCTION of stable dispersions of coal or like carbonaceous material in oil for use as fuel or for other purposes.—J. L. Strevens and W. B. Mitford. July 9, 1932. 407,360.

PRODUCTS of the anthrapyrimidine series, manufacture and production.—J. Y. Johnson (I. G. Farbenindustrie). Aug. 3, 1932. 407,363.

ALIPHATIC ANHYDRIDES, Manufacture.—H. Dreyfus. Sept. 9, 1932. 407,335 and 407,367.

SOLID CARBON DIOXIDE as refrigerant, utilisation.—F. Heywood and Imperial Chemical Industries, Ltd. Sept. 13, 1932. 407,328.

CELLULOSE ESTERS, manufacture.—Kodak, Ltd. Sept. 16, 1931. 407,355.

PROCESS for protecting wool, fur, hair, feathers, and the like against attack by moth.—I. G. Farbenindustrie. Sept. 16, 1931. 407,356.

DISPOSAL OF GAS-WORKS EFFLUENTS and the like.—Haywards Heath District Gas Co. and A. E. Whitcher. Sept. 16, 1932. 407,374.

ACYL ACETIC HYDROXYARYLAMIDES, manufacture.—A. Carpmael (I. G. Farbenindustrie). Sept. 22, 1932. 407,408.

STRONGLY BASIC PORPHINS and products obtained thereby, process for the manufacture.—Chemische Fabrik Vorm. Sandoz. Dec. 22, 1931. 407,486.

CELLULOSE ESTERS, manufacture.—British Celanese, Ltd. Jan. 26, 1932. 407,509.

VACUUM DISTILLATION of lubricating oils.—Red River Refining Co., Inc. May 5, 1932. 407,551.

INDIGOID DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. June 23, 1932. 407,578.

Complete Specifications Open to Public Inspection

ANTHRAPYRIMIDINES, manufacture and production.—I. G. Farbenindustrie. Sept. 17, 1932. 9176/33.

SODIUM AND POTASSIUM DI-CHROMATES, process for the manufacture.—I. G. Farbenindustrie. Sept. 17, 1932. 32103/33.

ANTHRAQUINONE DYESTUFFS, manufacture.—Soc. of Chemical Industry in Basle. Sept. 15, 1932. 24391/33.

ACETIC AND OTHER ALIPHATIC ACIDS from alcohols, manufacture. Usines de Melle. Sept. 16, 1932. 24484/33.

AZO DYESTUFFS containing copper in a complex form, process for the manufacture.—I. G. Farbenindustrie. Sept. 15, 1932. 25373/33.

Applications for Patents

ALCOHOLS, manufacture.—Air Reduction Co., Inc., and H. G. C. Fairweather. March 16. (June 25, '32.) 8311.

TREATMENT OF ORES, ETC.—American Smelting and Refining Co. March 16. 8366.

REDUCTION OF ORES, oxides, etc.—H. E. Coley. March 15. 8218.

PHENOL CONDENSATION PRODUCTS, preparation.—Compagnie de Produits Chimiques et Electrometallurgiques Alais, Froges, et Camargue. March 20. (France, March 22, '33.) 8726.

ALCOHOLS, manufacture.—J. Cristescu. March 16. (Roumania, March 17, '33.) 8387.

SELENIUM COMPOUND of benzanthrone series, manufacture.—E. I. du Pont de Nemours and Co. March 19. (United States, March 18, '33.) 8648.

LUBRICATING OILS, ETC.—E. I. du Pont de Nemours and Co. March 19. (United States, March 18, '33.) 8649.

HYDROGENATED HETEROCYCLIC CARBOXYLIC ACIDS, ETC.—E. I. du Pont de Nemours and Co. March 21. (United States, March 21, '33.) 8934.

SYNTHETIC RESINS.—E. I. du Pont de Nemours and Co. March 21. (United States, March 21, '33.) 8935.

PRINTING with mordant dyestuffs.—Durand and Huguenin Akt.-Ges. March 20. (Germany, March 20, '33.) 8743.

ALKALI CELLULOSE, manufacture.—W. W. Groves and I. G. Fabrenindustrie. March 16. 8342.

ENAMELS, manufacture.—W. W. Groves and I. G. Farbenindustrie. March 17. 8465.

FORMALDEHYDE from methane, production.—Gutehoffnungshutte Oberhausen Akt.-Ges., and W. W. Triggs. March 20. 8696.

ACTIVE CARBON, production.—E. Hene. March 20. (Germany, Dec. 11, '33.) 8770.

DYEING with vat dystuffs.—I. G. Farbenindustrie and J. Y. Johnson. March 15. 8185.

NITROGENEOUS CONDENSATION PRODUCTS, manufacture.—I. G. Farbenindustrie and J. Y. Johnson. March 16. 8332.

From Week to Week

THE EDITORIAL OFFICES of "Korrosion und Metallschutz" have removed to Sachsemplatz 7, Charlottenburg 9, Germany.

SIR HENRY WELCOME, governing-director of the Wellcome Foundation, has been awarded the Remington Honour Medal, the highest professional award in pharmacology.

AN INCREASE OF SALARY for the directors, managers, foremen and staff was announced by Hadfields, Ltd., of Sheffield, on March 30. Half of the 10 per cent. salary "cut" imposed in December, 1932, is being restored as from April 1.

LADY VAUGHAN-MORGAN died in a London nursing home on March 28, following an operation. She was the widow of Sir Kenyon Vaughan-Morgan, whose death last August led to a notable by-election in East Fulham, which was won by Mr. J. C. Wilmot for Labour.

GEORGE SCOTT AND SON (LONDON), LTD., Ernest Scott and Co., Ltd., Henry Balfour and Co., Ltd., and Enamelled Metal Products Corporation (1933), Ltd., are now in associated offices at Artillery House, Artillery Row, London, S.W.1 Their telephone number is Victoria 8708 (4 lines). Their works and Scottish offices are at Durie Foundry, Leven, Fife.

MR. JOHN W. BIGGART, one of the oldest public analysts in Scotland, died at Greenock on March 27. He held an appointment under Greenock Town Council for nearly sixty years. He was 80 years of age, and recently fractured his thigh in an accident. He was recognised as an authority in analytical work for the sugar industry.

MR. W. NEWTON DREW, junior pro-Chancellor of Sheffield University and a leading South Yorkshire industrialist, died on March 29. Mr. Drew, who was 64, was chairman and managing director of Newton, Chambers and Co., ironfounders and colliery owners, chairman of Hoyland Silkstone Coal Co., and Thorncliffe Coal Distillation, and a director of the National Benzole Co., Wombwell Main Colliery Co.

ACCORDING TO THE "LONDON GAZETTE," March 30, a general meeting of Naylor Brothers (London), Ltd., was duly convened and held on March 29, when a special resolution was passed to the effect "That the Company be wound up voluntarily under the provisions of the Companies Act, 1929, relating to a Members' voluntary winding-up, and that Mr. Harold William Phillips, of 44 Gloucester Avenue, Farnham Road, Slough, be and he is hereby appointed Liquidator, with power to distribute all or any of the assets of the Company in specie among the Members."

SPEAKING AT NORTHWICH at a gathering of officials and workmen, Sir Harry McGowan, chairman of Imperial Chemical Industries, Ltd., alluded to the very successful trading year of the combine. He said it was a marvellous achievement and was due to a large extent to the strenuous efforts of all in the organisation. Three years ago the future looked very obscure, but they saw a new spirit of confidence when England was made a protectionist country. There were now nearly 600,000 more people in employment. The I.C.I. at the end of last year were employing 5,000 more people than at the beginning of the year, and they had since engaged some hundreds more.

MR. JAMES JAMIESON, manufacturing chemist, 64 Cairnfield Place, Aberdeen, left estate to the value of £7,979.

MR. ARTHUR MANNING STURGES, B.Sc. (54), of Dene Cottage, East Dene, Sussex, a well-known bee farmer, formerly for 25 years an analytical chemist with I.C.I., Ltd., at Northwich, Cheshire, left estate valued at £3,483 (net personalty £1,796).

CONSTABLE, HART AND CO., LTD., of London, are extending their operations to Scotland and have had plans passed for the erection of works at Perth for the manufacture of bituminous road materials.

MR. HARRY TULLY, who has been elected to the board of directors of the Bede Metal and Chemical Co., Ltd., Hebburn-on-Tyne, is a member of the firm of Ridley, Son and Tully, shipowners, Newcastle-on-Tyne. He is also a director of the Mercantile Dry Dock Co., Ltd., Jarrow-on-Tyne and the North of England Protecting and Indemnity Association.

THE DISPUTE BETWEEN EMPLOYERS AND WORKERS in the British-Rio Tinto copper mines in the Province of Huelva, Spain, has been settled. A plebiscite of the workers has resulted in a decision by a large majority to accept the company's terms for a five-day week. The alternative was the dismissal of 1,000 men and a six-day week.

MR. CHARLES BOURNE, who started the West Moor Chemical Works, Killingworth, died this week after a short illness. Mr. Bourne, who was 76, went to Milan as assistant engineer to the Compagnie l'Union Des Gaz., in 1882, and afterwards became chief engineer of the San Celso Works and the three gas works in Milan.

THE L.N.E.R. ARE INTRODUCING petrol electric mobile cranes for the rapid unloading of freight. Already ten of their principal centres have been supplied, viz.: Hull (Alexandra Dock), Rotherham, Shipley, Loughborough, King's Cross, Marylebone, Leeds (Wellington), Bishopsgate, Ipswich and Manchester (Deansgate). These new cranes are able to be manoeuvred in restricted spaces and move from end to end of the freight trains as soon as they arrive at their destinations.

AT A SOCIAL FUNCTION AT LINLITHGOW last week, Mr. W. A. MacGillivray, manager of the Regent Factory of Imperial Chemical Industries (Nobels Explosives Group), and Mr. David Webster, were presented with long service awards by the company. Mr. MacGillivray has 41 years' service; Mr. Webster, 25 years. Mr. T. Donaldson, head of the technical department at the Ardeer factory, made the presentations.

MR. H. M. BARKER, who for the past twenty-two years has been in the service of the Vacuum Oil Co., has been appointed to the board of that company. Mr. Barker joined the company as a salesman in 1912. After working in Cheshire, Shropshire and North Wales in that capacity, he was successively branch manager in Ireland, South Wales and the West of England. In 1921 he was brought to London as marketing manager, a position which he held until last year. In his new position, Mr. Barker is to be responsible to the board for the industrial side of the company's work and for the control of sales in Glasgow, Newcastle, Manchester, Sheffield and Cardiff.

THE UTILISATION OF COAL will be the subject of a paper by Mr. William R. Gordon, director of the Coal Utilisation Council, at the Royal Society of Arts, John Street, Adelphi, London, on Wednesday, April 18, at 8 p.m. The Right Hon. Lord Hyndley, commercial adviser to the Coal Mines Department, will preside. The paper will deal with the decline in the output of British coal since 1913 and the reasons for that decline; how science has come to the rescue; sales promotion and sales training; the necessity for more orderly distribution; and the importance of the coal industry to the nation.

IMPERIAL CHEMICAL INDUSTRIES (Fertiliser and Synthetic Products), Ltd., were fined £10 and costs at Stockton County Police Court on March 28, for using an electric lamp not worked in a manner to prevent danger as was reasonably practicable. A second charge of using an electric lamp not efficiently earthed was withdrawn. It was alleged that while alterations and extensions were being carried out at the works, a portable standard electric lamp was used in a trench. On December 5 a man leaving the trench took hold of the standard of the lamp and received a severe electric shock, from which he died. After the accident, it was alleged, it was dscovered that there were certain defects in the lamp. These defects, it was submitted, should not have occurred had the lamp been maintained in a proper manner and in accordance with the regulations.

BRITISH TITAN PRODUCTS, LTD., Billingham, which has been formed to manufacture Titanium pigments, by Goodlass Wall and Associated Lead, Ltd., Imperial Chemical Industries, Ltd., Imperial Smelting Corporation, Ltd., and the National Lead Co. of the United States, are nearing the production stage. They have appointed Dr. G. F. New to the position of development manager, and he will take up his duties in June. For the past seven years Dr. New has been responsible for the physical side of the work at the Paint Research Station, Teddington; before that he was chief physicist to the Linen Industry Research Association. The wide experience has has had of the application of science to industry and of pigmentary problems in particular will stand him in good stead in dealing with the ever-increasing applications of titanium.

THE GREATER USE OF GAS AND ELECTRICITY for domestic purposes instead of raw coal, in order to secure a purer atmosphere in Glasgow, was advocated by Mr. F. W. Harris, F.I.C., city analyst and corporation chemist, in the course of a lecture he delivered at a meeting of the Public Health Section of the Royal Philosophical Society of Glasgow on March 14. Mr. Harris gave an account of the development of the means by which atmospheric pollution was measured, and he referred to the important part which Glasgow officials had taken in that development. He explained the original experiments which had been carried out by Mr. Peter Fyfe and himself, and the principles of the apparatus which they had used, he said, were afterwards incorporated in the standard form of apparatus at present in use throughout the country. Mr. Harris also explained the methods adopted for the determination of the intensity of ultra-violet rays.

ADVICE HAS BEEN RECEIVED by a number of United Kingdom firms from their Greek customers that certificates of origin should be visaed by a Greek Consul. The Department of Overseas Trade has, however, now received information from the Greek Legation in London to the effect that certificates of origin accompanying British goods sent to Greece issued by British Chambers of Commerce do not require any visa by Greek Consular Authorities in Great Britain, such certificates being valid without a Consular visa according to the Anglo-Greek Agreement of 1926.

THE CHEMICAL SOCIETY will hold an ordinary scientific meeting on Thursday, April 19, to commemorate the Centenary of Mendeléeff, when Lord Rutherford, D.Sc., F.R.S., will deliver a lecture entitled "The Periodic Law of Mendeléeff, and its Interpretation." This meeting will be held in the lecture theatre of the Royal Institution, Albemarle Street, London, W.1. Admission for Fellows and visitors will be by ticket only. Each Fellow has the privilege of introducing two visitors, for whom tickets will be issued as accommodation allows. Applications for tickets should be made to the Assistant Secretary, The Chemical Society, Burlington House, Piccadilly, London, W.1, by Monday, April 16.

DR. F. A. FREETH, chief research chemist, Imperial Chemical Industries, Ltd., addressed the North-West Branch of the British Association of Refrigeration, at Manchester Town Hall on March 23, his subject being the importance of refrigeration in modern life. He said the Government was engaged in the consideration of immense schemes of housing, many of which would include large blocks of flats for the accommodation of working people. He suggested these flats should be heated by some rational system for the distribution of heat such as the pressure system already used by towns on the Continent. He could see nothing to stop modern blocks of flats in the future having their cold laid on and metered to the larder of every house from a central station.

BY A TREASURY ORDER which came into force on March 28, imported drums and barrels of iron or steel, of a capacity of a gallon or more, will be chargeable with "such a rate of duty as will, with the general *ad valorem* duty, amount to ½d. a lb. or 20 per cent. of the value of the goods, whichever is the greater." The Import Duties Advisory Committee, in recommending this impost, stated that "these goods are used as containers for oils, paints, soaps, chemicals, etc., and are at present chargeable to an additional duty of 10 per cent. as hollow-ware. It has been represented to us that the present duty has been of little assistance to manufacturers of drums and barrels in this country in their efforts to secure a greater share of the home market. Foreign competition is especially severe in the cheaper types of large containers, and we have come to the conclusion that the home industry requires some further assistance if it is to be able to compete successfully for this section of the trade. We recommend, therefore, that a specific duty of one-halfpenny per lb. should be imposed where such a duty would exceed 20 per cent. of the value of the goods. The increased duty will not, in our opinion, have any adverse effect upon any other industry."

Weekly Prices of British Chemical Products

Review of Current Market Conditions

MARKETS have been quiet this week owing to the Easter holiday. Among industrial chemicals, formaldehyde, formic and oxalic acids, and saltcake have been in quite good demand, and some business has been done in acetic acid, acetone, and salammoniac. There has been a fairly steady demand for coal tar products. Business in the pharmaceutical chemicals market has been about average for the time of the year and prices mainly unchanged. Some inquiries have been received for bromides, hexamine, phenacetin, and sodium benzoate. The demand for essential oils has been limited.

LONDON.—The demand for chemicals generally is still maintained, but there are few alterations in prices to report.

MANCHESTER.—The past week has witnessed a colourless resumption of business on the Manchester chemical market after the Easter holidays. Most of the consuming works in Lancashire and the near Yorkshire districts restarted on Tuesday morning, but in a number of instances the holidays were extended until Wednesday morning. Deliveries against contracts have been resumed on a fair scale, but, up to the time of writing, little or no fresh buying of any consequence has been reported and relatively quiet conditions are expected during the remainder of the week. So far as prices are concerned, there has been a sprinkling of fluctuations, but these have not been sufficient to influence the general steadiness of the market and relatively firm conditions are looked for. The by-products market, also, has been featureless, although in this case there is a continued easy tendency to be noted in respect of a number of the principal light materials, the demand for which on this centre has been dwindling during the past month or two.

GLASGOW.—Owing to the Easter holidays, business has been practically at a standstill in the Scottish heavy chemical market.

Price Changes

ACID, TARTARIC.—LONDON: 11¼d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 1s. 0¼d.

ARSENIC.—MANCHESTER: White powdered Cornish, £20 10s. at mines.

LEAD ACETATE.—MANCHESTER: White, £32 to £34; brown, £36 10s. per ton.

POTASH, CAUSTIC.—LONDON: £42. MANCHESTER: £38.

ACID, CARBOLIC.—Crystals, 8½d. to 9d. per lb.; crude, 60's, 2s. 11d. to 2s. 2½d. per gal. MANCHESTER: Crystals, 9d. per lb.; crude, 2s. 3d. per gal. SCOTLAND: 60's, 2s. 6d. to 2s. 7d.

BENZOL.—At works, crude, 9d. to 9½d. per gal.; standard motor, 1s. 4d. to 1s. 4½d.; 90%, 1s. 4¼d. to 1s. 5½d.; pure, 1s. 7½d. to 1s. 8d. LONDON: Motor, 1s. 6½d. SCOTLAND: Motor, 1s. 6½d.

PITCH.—£2 15s. per ton, f.o.b. East Coast port.

ACETATE OF LIME.—Brown, £9 to £10. Grey, £16 to £17. Liquor, brown, 30° Tw., 7d. to 9d. per gal. MANCHESTER: Brown, £12 10s.; grey, £17 10s.

Company News

Borax Consolidated, Ltd.—The directors have decided to postpone consideration of the dividend on the 6 per cent. preferred ordinary shares until after the end of the financial year.

Tharsis Sulphur and Copper Co.—The net profit for the year 1933 is £43,713, plus £71,037 brought in, making £114,750. No dividend is recommended.

Edgar Allen & Co.—It is announced that payment on the cumulative preference dividend has been deferred. The dividend is paid to March 31, 1931.

Briton Ferry Chemical and Manure Co.—The accounts for the year 1933 show a debit balance of £9,471, after allowing £1,011 for depreciation. The sum of £5,321 is transferred from reserve, leaving a debit of £4,150 to be carried forward.

Allied Chemical and Dye Corporation (U.S.).—The net income for 1933 was $14,595,521, equivalent after 7 per cent. preferred dividends, to $5.50 a share on the common stock. There was a deficit, after payment of dividends in 1933, of $1,107,853.

Thos. Firth and John Brown.—The directors state that while trading conditions have substantially improved during the past year, they feel that the position does not warrant the payment of a dividend on the preference capital out of profits.

British Enka Artificial Silk Co.—The working profit for the year 1933 amounted to £65,118, compared with £30,463 in 1932. Depreciation allowance is £32,244, compared with £84,555 a year ago, and after fees, debenture charges, etc., the net profit is shown at £2,039, against a loss of £85,502. The debit balance on profit and loss now amounts to £567,950.

Joseph Crosfield and Sons.—For the year 1933 the profit amounted to £730,041 to which is added the balance brought forward £73,217, making £803,258. The preference dividends absorbed £227,500 and the dividend on the ordinary shares at the rate of 30 per cent. £450,000; the general reserve receives £39,288, the balance of £86,470 going forward.

Wright, Layman and Umney (1932).—The report for the year 1933 shows that after fees, staff funds, provision for bad debts and depreciation, the profit is £44,705. The tax reserve absorbs £6,800 and the directors recommend a final dividend of 7½ per cent. on the ordinary shares, making 10 per cent. for the year, transferring to reserve £10,000, and carrying forward £8,139.

William Gossage and Sons.—After charging all expenses, including depreciation of buildings and plant, the net profit for 1933 was £210,546, to which is added the amount brought forward £37,660, making £248,206. The dividend on the 5 per cent. first cumulative preference shares to December 31, 1933, absorbs £22,500, that on the 6½ per cent. cumulative preference shares to December 31, 1933, £48,750, and a dividend of 20 per cent. on the ordinary shares £140,000, leaving to be carried forward £36,956.

Forthcoming Events

Apr. 9.—Ceramic Society. Question Box Evening. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Apr. 9.—Society of Chemical Industry (London Section). "A New Problem in Fruit Preservation." Miss M. Oliver and Theodore Rendle. 8 p.m. Burlington House, Piccadilly, London.

Apr. 10.—Institution of Petroleum Technologists. 5.30 p.m. John Street, Adelphi, London.

Apr. 12 to 14.—The Faraday Society. General Discussion on the Determination and Interpretation of Dipole Moments. Exeter College, Oxford.

Apr. 12.—Oil and Colour Chemists' Association. "The Manufacture of Oilskins." J. Milligan. 7.30 p.m. 30 Russell Square, London.

Apr. 12.—Derby Chemists' Joint Committee. "Recent Developments in the Field of Petroleum." Dr. A. E. Dunstan. Derby Technical College.

Apr. 12.—Institute of Metals (London Section). Annual general meeting and open discussion. 7.30 p.m. 83 Pall Mall, London.

Apr. 13.—Society of Chemical Industry (Yorkshire Section). "Silicosis and Asbestosis." Professor M. J. Stewart, Dr. F. S. Fowweather, Dr. W. R. Jones, Dr. F. V. Tideswell. 7 p.m. Grand Hotel, Sheffield.

Apr. 13.—Oil and Colour Chemists' Association (Manchester Section). Annual meeting and smoker. 7 p. m. Manchester, Ltd., Restaurant, Cross Street, Manchester.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

France.—A firm at Grenoble wishes to obtain the representation of United Kingdom china clay. (Ref. No. 390.)

Portugal.—An agent at Oporto wishes to obtain the representation of United Kingdom manufacturers of castor oil, chemical and pharmaceutical products. (Ref. No. 393.)

Argentina.—A representative in Buenos Aires desires to secure the representation of United Kingdom manufacturers of zinc white powder, artificial resins, soda ash, caustic soda, lithopone, alcohol, solvents, etc. (Ref. No. 399.)

Iraq.—The Commercial Secretary to H.M. Embassy at Bagdad reports that the Bagdad District Water Board is calling for tenders, to be presented in Bagdad by April 26, 1934, for the supply of all plant, appliances and fittings necessary for the clarification of the raw water of the Tigris. The open gravity filters should have a capacity of 210,000 gallons per hour. (Ref. G.Y. 13625.)

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